arranging data to be transmitted in a matrix; and

randomly rearranging said data by exchanging data units between rows and between columns, and outputting said rearranged data in time series.

2.(Amended) A de-interleaving method comprising the steps of:

arranging received data having been interleaved in a matrix; and

randomly rearranging said data by exchanging data units between rows and between columns, and outputting said data in time series, thereby outputting said received data in the order before said received data was interleaved.

3.(Amended) An interleaving apparatus for interleaving data to be transmitted, comprising:

a first storing unit for storing data to be transmitted; and

a first control unit for controlling said first storing unit so that said data to be transmitted is outputted from said first storing unit with said data to be transmitted arranged in a matrix and said data to be transmitted randomly rearranged by exchanging data units between rows and between columns.

4.(Amended) The interleaving apparatus according to claim 3, wherein said first control unit comprises a first write control unit for generating a write address to be used to write said data to be transmitted in said first storing unit with said data to be transmitted arranged in a matrix and randomly rearranged by exchanging data units between rows and between columns and for writing said data to be transmitted in said first storing unit, and said first control unit reads said data to be transmitted stored in said first

storing unit in the order of addresses.

5.(Not Amended) The interleaving apparatus according to claim 4, wherein said first write control unit comprises a column number generating unit for randomly generating column numbers and a row number generating unit for randomly generating row numbers, and said first write control unit writes said data to be transmitted in said first storing unit with numbers generated by said column number generating unit and said row number generating unit as said write address to write said data to be transmitted in said first storing unit.

6.(Not Amended) The interleaving apparatus according to claim 5, wherein each of said column number generating unit and said row number generating unit is configured with a memory for holding numbers used as addresses in a predetermined order.

7.(Amended) The interleaving apparatus according to claim 3, wherein said first control unit writes said data to be transmitted in said first storing unit in the order of addresses, and said first control unit comprises a first read control unit for generating a read address to be used to read said data to be transmitted from said first storing unit with said data to be transmitted stored in said first storing unit arranged in a matrix and randomly rearranged by exchanging data units between rows and between columns to read said data to be transmitted.

8.(Not Amended) The interleaving apparatus according to claim 7, wherein said first read control unit

comprises a column number generating unit for randomly generating column numbers and a row number generating unit for randomly generating row numbers, and said first read control unit reads said data to be transmitted from said first storing unit with numbers generated by said column number generating unit and said row number generating unit as said read address.

9.(Not Amended) The interleaving apparatus according to claim 8, wherein each of said column number generating unit and said row number generating unit is configured with a memory for holding numbers used as addresses in a predetermined order.

10.(Amended) A de-interleaving apparatus for de-interleaving received data, comprising:

a second storing unit for storing said received data; and

a second control unit for controlling said second storing unit so that said received data is outputted from said second storing unit in a state before said received data was interleaved by arranging said received data in a matrix and randomly rearranging said received data by exchanging data units between rows and between columns.

11. (Amended) The de-interleaving apparatus according to claim 10, wherein said second control unit comprises a second write control unit for generating a write address to be used to write said received data in said second storing unit in a state before said received data was interleaved by arranging said received data in a matrix and randomly rearranging said received data by exchanging data units between rows and between columns to write said received data, and said second control unit

reads said received data stored in said second storing unit in the order of addresses.

12. (Not Amended) The de-interleaving apparatus according to claim 11, wherein said second write control unit comprises a column number generating unit for randomly generating column numbers and a row number generating unit for randomly generating row numbers, and said second write control unit writes said data in said second storing unit with numbers generated by said column number generating unit and said row number generating unit as a write address.

13. (Not Amended) The de-interleaving apparatus according to claim 12, wherein each of said column number generating unit and said row number generating unit is configured with a memory for holding numbers used as addresses in a predetermined order.

14. (Amended) The de-interleaving apparatus according to claim 10, wherein said second control unit writes said received data in said second storing unit in the order of addresses, and said second control unit has a second read control unit for generating a read address to be used to read said received data in a state before said received data was interleaved from said second storing unit by arranging said received data stored in said second storing unit in a matrix and randomly rearranging said received data by exchanging data units between rows and between columns and for reading said received data from said second storing unit.

15. (Not Amended) The de-interleaving apparatus according to claim 14, wherein said second read

control unit comprises a column number generating unit for randomly generating column numbers and a row number generating unit for randomly generating row numbers, and said second read control unit reads said received data from said second storing unit with numbers generated by said column number generating unit and said row number generating unit as a read address.

16. (Not Amended) The de-interleaving apparatus according to claim 15, wherein each of said column number generating unit and said row number generating unit is configured with a memory for holding numbers used as addresses in a predetermined order.

17. (Amended) An interleaving/de-interleaving system comprising an interleaving apparatus for interleaving data to be transmitted and a de-interleaving apparatus for receiving said transmitted data interleaved by said interleaving apparatus to de-interleave said transmitted data, wherein said interleaving apparatus outputs said data to be transmitted with said data to be transmitted arranged in a matrix and randomly rearranged by exchanging data units between rows and between columns, and

said de-interleaving apparatus outputs received data in a state before said transmitted data was interleaved by arranging said received data in a matrix and randomly rearranging said received data by exchanging data units between rows and between columns.

18. (Amended) An interleaving/de-interleaving apparatus for transmitting/receiving interleaved data to/from an opposite interleaving/de-interleaving apparatus, comprising:

an interleaving apparatus for outputting data to be transmitted to said opposite

interleaving/de-interleaving apparatus with said data to be transmitted arranged in a matrix, and said data to be transmitted randomly rearranged by exchanging data units between rows and between columns; and

a de-interleaving apparatus for outputting received data interleaved in said opposite interleaving/de-interleaving apparatus in a state before said received data was interleaved by arranging said received data in a matrix, and randomly rearranging said received data by exchanging data units between rows and between columns.

Please add the following new claims:

19.(New) An interleaving apparatus for interleaving data to be transmitted, comprising:

a first storing unit for storing data to be transmitted;

a first control unit for controlling said first storing unit so that said data to be transmitted is outputted from said first storing unit with said data to be transmitted arranged in a matrix and randomly rearranged by exchanging data units at least between rows or between columns; and

wherein said first control unit comprises a first write control unit for generating a write address to be used to write said data to be transmitted in said first storing unit with said data to be transmitted arranged in a matrix and randomly rearranged by exchanging data units at least between rows or between columns and for writing said data to be transmitted in said first storing unit, and said first control unit reads said data to be transmitted stored in said first storing unit according to the order of addresses of said first storing unit.

20.(New) An interleaving apparatus for interleaving data to be transmitted, comprising:

   a first storing unit for storing data to be transmitted;

   a first control unit for controlling said first storing unit so that said data to be transmitted is outputted from said first storing unit with said data to be transmitted arranged in a matrix and randomly rearranged by exchanging data units at least between rows or between columns; and

   wherein said first control unit comprises a first write control unit for generating a write address to be used to write said data to be transmitted in said first storing unit with said data to be transmitted arranged in a matrix and randomly rearranged by exchanging data units at least between rows or between columns and for writing said data to be transmitted in said first storing unit so as to be read said data from said first storing unit according to the order of addresses of said first storing unit.

21.(New) The interleaving apparatus according to claim 19, wherein said first read control unit comprises a column number generating unit for randomly generating column numbers and a row number generating unit for randomly generating row numbers, and said first write control unit writes said data to be transmitted in said first storing unit with numbers generated by said column number generating unit and said row number generating unit as said write address to write said data to be transmitted in said first storing unit.

22.(New) The interleaving apparatus according to claim 20, wherein said first write control unit comprises a column number generating unit for randomly generating column numbers and a row number generating unit for randomly generating row numbers, and   said first write control unit writes

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said data to be transmitted in said first storing unit with numbers generated by said column number generating unit and said row number generating unit as said write address to write said data to be transmitted in said first storing unit.

23.(New) An interleaving apparatus for interleaving data to be transmitted, comprising:

a first storing unit for storing data to be transmitted;

a first control unit for controlling said first storing unit so that said data to be transmitted is outputted from said first storing unit with said data to be transmitted arranged in a matrix and randomly rearranged by exchanging data units at least between rows or between columns; and

wherein said first control unit writes said data to be transmitted in said first storing unit according to the order of addresses of said first storing unit, and said first control unit comprises a first read control unit for generating a read address to be used to read said data to be transmitted from said first storing unit with said data to be transmitted stored in said first storing unit arranged in a matrix and randomly rearranged by exchanging data units at least between rows or between columns to read said data to be transmitted.

24.(New) An interleaving apparatus for interleaving data to be transmitted, comprising:

a first storing unit for storing data to be transmitted;

a first control unit for controlling said first storing unit so that said data to be transmitted is outputted from said first storing unit with said data to be transmitted arranged in a matrix and randomly rearranged by exchanging data units at least between rows or between columns; and

wherein said first control unit comprises a first read control unit for generating a read address to be used to read said data to be transmitted, written in the order of addresses of said first storing unit, from said first storing unit with said data to be transmitted stored in said first storing unit arranged in a matrix and randomly rearranged by exchanging data units at least between rows or between columns to read said data to be transmitted.

25.(New) The interleaving apparatus according to claim 23, wherein said first read control unit comprises a column number generating unit for randomly generating column numbers and a row number generating unit for randomly generating row numbers, and said first read control unit reads said data to be transmitted from said first storing unit with numbers generated by said column number generating unit and said row number generating unit as said read address.

26.(New) The interleaving apparatus according to claim 24, wherein said first read control unit comprises a column number generating unit for randomly generating column numbers and a row number generating unit for randomly generating row numbers, and said first read control unit reads said data to be transmitted from said first storing unit with numbers generated by said column number generating unit and said row number generating unit as said read address.

27.(New) The interleaving apparatus according to claim 21, wherein each of said column number generating unit and said row number generating unit is configured with a memory for holding numbers used as addresses in a predetermined order.

28.(New) The interleaving apparatus according to claim 22, wherein each of said column number generating unit and said row number generating unit is configured with a memory for holding numbers used as addresses in a predetermined order.

29.(New) The interleaving apparatus according to claim 25, wherein each of said column number generating unit and said row number generating unit is configured with a memory for holding numbers used as addresses in a predetermined order.

30.(New) The interleaving apparatus according to claim 26, wherein each of said column number generating unit and said row number generating unit is configured with a memory for holding numbers used as addresses in a predetermined order.

31.(New) A de-interleaving apparatus for de-interleaving received data, comprising:

a second storing unit for storing said received data;

a second control unit for controlling said second storing unit so that said received data is outputted from said second storing unit in a state before said received data was interleaved by arranging said received data in a matrix and randomly rearranging said received data by exchanging data units between rows and between columns; and

wherein said second control unit comprises a second write control unit for generating a write address to be used to write said received data in said second storing unit in a state before said received

data was interleaved by arranging said received data in a matrix and randomly rearranging said received

data by exchanging data units at least between rows or between columns to write said received data, and

said second control unit reads said received data stored in said second storing unit according to the order

of addresses of said second storing unit.

32.(New) A de-interleaving apparatus for de-interleaving received data, comprising:

a second storing unit for storing said received data; .

a second control unit for controlling said second storing unit so that said received data is

outputted from said second storing unit in a state before said received data was interleaved by arranging

said received data in a matrix and randomly rearranging said received data by exchanging data units

between rows and between columns; and

wherein said second control unit comprises a second write control unit for generating a

write address to be used to write said data to be transmitted in said second storing unit with said data to

be transmitted arranged in a matrix and randomly rearranged by exchanging data units at least between

rows or between columns and for writing said data to be transmitted in said second storing unit so as to

be read said data from said second storing unit according to the order of addresses of said second storing

unit.

33.(New) The interleaving apparatus according to claim 31, wherein said second write control unit

comprises a column number generating unit for randomly generating column numbers and a row

number generating unit for randomly generating row numbers, and said second write control unit writes

said data to be transmitted in said first storing unit with numbers generated by said column number

generating unit and said row number generating unit as said write address to write said data to be

transmitted in said second storing unit.

34.(New) The interleaving apparatus according to claim 32, wherein said second write control unit

comprises a column number generating unit for randomly generating column numbers and a row

number generating unit for randomly generating row numbers, and said second write control unit writes

said data to be transmitted in said first storing unit with numbers generated by said column number

generating unit and said row number generating unit as said write address to write said data to be

transmitted in said second storing unit.

35.(New) A de-interleaving apparatus for de-interleaving received data, comprising:

a second storing unit for storing said received data;

a second control unit for controlling said second storing unit so that said received data is

outputted from said second storing unit in a state before said received data was interleaved by arranging

said received data in a matrix and randomly rearranging said received data by exchanging data units

between rows and between columns; and

wherein said second control unit writes said data to be transmitted in said second storing

unit according to the order of addresses of said second storing unit, and said second control unit

comprises a second read control unit for generating a read address to be used to read said data to be

transmitted from said second storing unit with said data to be transmitted stored in said second storing

unit arranged in a matrix and randomly rearranged by exchanging data units at least between rows or between columns to read said data to be transmitted.

36.(New) A de-interleaving apparatus for de-interleaving received data, comprising:

a second storing unit for storing said received data;

a second control unit for controlling said second storing unit so that said received data is outputted from said second storing unit in a state before said received data was interleaved by arranging said received data in a matrix and randomly rearranging said received data by exchanging data units between rows and between columns; and

wherein said second control unit comprises a second read control unit for generating a read address to be used to read said data to be transmitted, written in the order of addresses of said second storing unit, from said second storing unit with said data to be transmitted stored in said second storing unit arranged in a matrix and randomly rearranged by exchanging data units at least between rows or between columns to read said data to be transmitted.

37.(New) The de-interleaving apparatus according to claim 35, wherein said second read control unit comprises a column number generating unit for randomly generating column numbers and a row number generating unit for randomly generating row numbers, and said second read control unit reads said received data from said second storing unit with numbers generated by said column number generating unit and said row number generating unit as a read address.

38.(New) The de-interleaving apparatus according to claim 36, wherein said second read control unit comprises a column number generating unit for randomly generating column numbers and a row number generating unit for randomly generating row numbers, and said second read control unit reads said received data from said second storing unit with numbers generated by said column number generating unit and said row number generating unit as a read address.

39.(New) The de-interleaving apparatus according to claim 33, wherein each of said column number generating unit and said row number generating unit is configured with a memory for holding numbers used as addresses in a predetermined order.

40.(New) The de-interleaving apparatus according to claim 34, wherein each of said column number generating unit and said row number generating unit is configured with a memory for holding numbers used as addresses in a predetermined order.

41.(New) The de-interleaving apparatus according to claim 37, wherein each of said column number generating unit and said row number generating unit is configured with a memory for holding numbers used as addresses in a predetermined order.

42.(New) The de-interleaving apparatus according to claim 38, wherein each of said column number generating unit and said row number generating unit is configured with a memory for holding numbers used as addresses in a predetermined order.

43.(New) A transmitting apparatus with a interleaving function, comprising:

an error detection encoding unit for encoding an error detecting bit and for adding said error detecting bit to data to be transmitted;

an error correction encoding unit for adding the error correcting code, which is to be used for error correction, to said data to be transmitted, sent from said error detection encoding unit;

an interleaving unit which includes a first storing unit for storing said data to be transmitted, from said error detection encoding unit, and a first control unit for controlling said first storing unit so that said data to be transmitted is outputted from said first storing unit with said data to be transmitted arranged in a matrix and randomly rearranged by exchanging data units at least between rows or between columns;

a signal assembling unit assembles interleaved data from said interleaving unit to form a signal format suited for transmission; and

a spreading unit for converting the signal sent from said signal assembling unit into a spread signal using a predetermined spreading code.

44.(New) The transmitting apparatus with a interleaving function according to claim 43, wherein said first control unit comprises a first write control unit for generating a write address to be used to write said data to be transmitted in said first storing unit with said data to be transmitted arranged in a matrix and randomly rearranged by exchanging data units at least between rows or between columns and for writing said data to be transmitted in said first storing unit, and said first control unit reads said data to

be transmitted stored in said first storing unit according to the order of addresses of said first storing unit.

45.(New) The transmitting apparatus with a interleaving function according to claim 43, wherein said first control unit writes said data to be transmitted in said first storing unit according to the order of addresses of said first storing unit, and said first control unit comprises a first read control unit for generating a read address to be used to read said data to be transmitted from said first storing unit with said data to be transmitted stored in said first storing unit arranged in a matrix and randomly rearranged by exchanging data units at least between rows or between columns to read said data to be transmitted.

46.(New) A receiving apparatus with a de-interleaving function, comprising:

a de-spreading unit for separating a desired signal from a received signal using a de-spreading code;

a data extracting unit for extracting received data from the signal separated by the de-spreading unit;

a de-interleaving unit which includes a second storing unit for storing said received data from said de-spreading unit, and a second control unit for controlling said second storing unit so that said received data is outputted from said second storing unit in a state before said received data was interleaved by arranging said received data in a matrix and randomly rearranging said received data by exchanging data units between rows and between columns;

an error correction decoding unit for decoding said received data de-interleaved by said de-

interleaving unit, and for correcting an error included in said received data using an error correcting code; and

an error detecting unit for detecting an error detecting bit added when said received data is transmitted on the basis of a bit structure of the error detecting bit previously set.

47.(New) The receiving apparatus with a de-interleaving function according to claim 46, wherein said second control unit comprises a second write control unit for generating a write address to be used to write said received data in said second storing unit in a state before said received data was interleaved by arranging said received data in a matrix and randomly rearranging said received data by exchanging data units at least between rows or between columns to write said received data, and said second control unit reads said received data stored in said second storing unit according to the order of addresses of said second storing unit.

48.(New) The receiving apparatus with a de-interleaving function according to claim 46, wherein said second control unit writes said data to be transmitted in said second storing unit according to the order of addresses of said second storing unit, and said second control unit comprises a second read control unit for generating a read address to be used to read said data to be transmitted from said second storing unit with said data to be transmitted stored in said first storing unit arranged in a matrix and randomly rearranged by exchanging data units at least between rows or between columns to read said data to be transmitted.

49.(New) A transmitting and receiving apparatus with a interleaving and de-interleaving function, comprising:

an error detection encoding unit for encoding an error detecting bit and for adding said error detecting bit to data to be transmitted;

an error correction encoding unit for adding the error correcting code, which is to be used for error correction, to said data to be transmitted, sent from said error detection encoding unit;

an interleaving unit which includes a first storing unit for storing said data to be transmitted, from said error detection encoding unit, and a first control unit for controlling said first storing unit so that said data to be transmitted is outputted from said first storing unit with said data to be transmitted arranged in a matrix and randomly rearranged by exchanging data units at least between rows or between columns;

a signal assembling unit assembles interleaved data from said interleaving unit to form a signal format suited for transmission;

a spreading unit for converting the signal sent from said signal assembling unit into a spread signal using a predetermined spreading code;

a duplexer for transmitting the spread signal from said spreading unit to an antenna;

a de-spreading unit for separating a desired signal from a received signal via said antenna and duplexer using a de-spreading code;

a data extracting unit for extracting received data from the signal separated by the de-spreading unit;

a de-interleaving unit which includes a second storing unit for storing said received data from said

de-spreading unit, and a second control unit for controlling said second storing unit so that said received data is outputted from said second storing unit in a state before said received data was interleaved by arranging said received data in a matrix and randomly rearranging said received data by exchanging data units between rows and between columns;

an error correction decoding unit for decoding said received data de-interleaved by said de-interleaving unit, and for correcting an error included in said received data using an error correcting code; and

an error detecting unit for detecting an error detecting bit added when said received data is transmitted on the basis of a bit structure of the error detecting bit previously set.

50.(New) The transmitting and receiving apparatus according to claim 49, wherein said first control unit comprises a first write control unit for generating a write address to be used to write said data to be transmitted in said first storing unit with said data to be transmitted arranged in a matrix and randomly rearranged by exchanging data units at least between rows or between columns and for writing said data to be transmitted in said first storing unit, and said first control unit reads said data to be transmitted stored in said first storing unit according to the order of addresses of said first storing unit.

51.(New) The transmitting and receiving apparatus according to claim 49, wherein said first control unit writes said data to be transmitted in said first storing unit according to the order of addresses of said first storing unit, and said first control unit comprises a first read control unit for generating a read address to be used to read said data to be transmitted from said first storing unit with said data to be

transmitted stored in said first storing unit arranged in a matrix and randomly rearranged by exchanging data units at least between rows or between columns to read said data to be transmitted.

52.(New) The transmitting and receiving apparatus according to claim 49, wherein said second control unit comprises a second write control unit for generating a write address to be used to write said received data in said second storing unit in a state before said received data was interleaved by arranging said received data in a matrix and randomly rearranging said received data by exchanging data units at least between rows or between columns to write said received data, and said second control unit reads said received data stored in said second storing unit according to the order of addresses of said second storing unit.

53.(New) The transmitting and receiving apparatus according to claim 49, wherein said second control unit writes said data to be transmitted in said second storing unit according to the order of addresses of said second storing unit, and said second control unit comprises a second read control unit for generating a read address to be used to read said data to be transmitted from said second storing unit with said data to be transmitted stored in said first storing unit arranged in a matrix and randomly rearranged by exchanging data units at least between rows or between columns to read said data to be transmitted.